

REMARKS/ARGUMENTS

Favorable reconsideration of this application, in light of the present amendments and following discussion, is respectfully requested.

Claims 1-7, 9-18, 20-23, and 25 are pending. Claims 8, 19, 24, and 26 are canceled. Claims 1 and 12 are amended. Support for the amendments to Claims 1 and 12 can be found in the specification in numbered paragraphs [0061]-[0065], for example. No new matter is added.

In the outstanding Office Action, Claims 1, 7, 9-12, 18, 20-23, and 25 were rejected under 35 U.S.C. § 103(a) as obvious over Flanigan et al. (U.S. Patent No. 6,081,414, herein “Flanigan”) in view of Ohmi et al. (U.S. Patent No. 6,217,633, herein “Ohmi”). Claims 2 and 13 were rejected under 35 U.S.C. § 103(a) as obvious over Flanigan, Ohmi, and Watanabe et al. (U.S. Patent No. 5,625,526, herein “Watanabe”). Claims 3, 4, 5, 14, 15, and 16 were rejected under 35 U.S.C. § 103(a) as obvious over Flanigan, Ohmi, and Nagasaki (U.S. Patent No. 6,215,643, herein “Nagasaki”). Claims 6 and 17 were rejected under 35 U.S.C. § 103(a) as obvious over Flanigan, Ohmi, Nagasaki, and Paschen (F. Paschen published paper (Wied. Ann., 37, 69, 1889). The indication of allowable subject matter in the previous Office Action was withdrawn.

Regarding the rejection of Claims 1, 7, 9-12, 18, 20-23, and 25 as obvious over Flanigan in view of Ohmi, that rejection is respectfully traversed by the present response.

Amended independent Claim 1 recites, in part:

controlling pressure in the vacuum processing chamber to a predetermined pressure while supplying inert gas as a purging gas into the vacuum processing chamber, wherein a pressure of said insert gas is determined on a Paschen’s curve so that electrical charging of the component in the vacuum processing chamber is suppressed.

Accordingly, the method controls pressure in the vacuum processing chamber to a predetermined pressure while supplying an inert gas as a purging gas into the processing

chamber. The pressure of the inert gas is determined on a Paschen's curve so that electrical charging of the component in the processing chamber is suppressed.

Amended independent Claim 12 recites substantially similar features.

The outstanding Office Action states:

It is noted that neither Flanigan nor Ohmi do expressly disclose the purging with nitrogen suppresses the electrical charging of the component in the vacuum processing chamber (electrostatic chuck-pedestal). However, it would appear that the purging of Ohmi would result in suppressing electrical charging of the component in the vacuum processing chamber (namely the electrostatic chuck-pedestal) since nitrogen is an inert gas and the chuck is exposed to the inert gas before loading the wafer when the later is out of the processing chamber and no plasma is generated during loading/unloading, which is the same condition as the one claimed by applicant's claims 1 and 12.¹

Accordingly, the outstanding Office Action asserts that the purging of Ohmi results in suppressing electrical charging. The outstanding Office Action also asserts that condition in Ohmi is the same as the condition claimed in Claims 1 and 12.

However, referring to the description of paragraphs [0061] to [0065] of the present specification, the ease of occurrence of the electric discharge between the gas flow path (7) and the showerhead (15) is shown as a change represented by a curve called a Paschen's curve as shown in FIG. 4. Supposing that nitrogen is used as a gas species, the minimum sparking voltage is 250 V under a condition in which the gap length \times pressure (pd) is 0.76, for example. As is apparent from FIG. 4, the Paschen's curve presents a gentle rise as the gap length \times pressure (pd) increases from a point showing the minimum sparking voltage (the lowest point of the Paschen's curve), while as it decreases, the Paschen's curve presents an abrupt rise.

The charged voltage at each pressure was examined with the aforesaid pressure in the vacuum processing chamber being varied, an effect of suppressing the charged voltage was observed at pressures of about 4 Pa (30 mTorr) or higher, and it was possible to effectively

¹ Outstanding Office Action, page 5.

suppress the charged voltage at pressures in a range of about 13 Pa (100 mTorr) to about 40 Pa (300 mTorr). Therefore, it is particularly beneficial to set the pressure in the vacuum processing chamber to about 13 Pa (100 mTorr) to about 40 Pa (300 mTorr).

The above-described pressure range corresponds to not lower than about 0.6 times nor higher than about 2.0 times the pressure corresponding to the minimum sparking voltage in the Paschen's curve. Therefore, in order to better suppress the charged voltage, the pressure in the vacuum processing chamber is preferably set to not lower than about 0.6 times nor higher than about 2.0 times the pressure corresponding to the minimum sparking voltage in the Paschen's curve.

Therefore, the pressure of the purging gas within a range of 13 Pa to 40 Pa would not have been determined by routine skill in the art as asserted in the outstanding Office Action, but by the inventive approach using the Paschen's curve.

For example, if the pressure of 1 Pa in Ohmi were employed, the electric discharge cannot be suppressed based on the Paschen's curve. Moreover, Ohmi does not discuss the Paschen's curve at all. Indeed, other than Paschen, none of the cited references mentions the Paschen curve.

The outstanding Office Action also states:

However, it would appear that the purging of Ohmi would result in suppressing electrical charging of the component in the vacuum processing chamber (namely the electrostatic chuck-pedestal) since nitrogen is an inert gas and the chuck is exposed to the inert gas before loading the wafer when the later is out of the processing chamber and no plasma is generated during loading/unloading, which is the same condition as the one claimed by applicant's claims 1 and 12.²

Thus, the outstanding Office Action asserts that condition in Ohmi is the same as the condition claimed in Claims 1 and 12 regarding suppressing an electrical charging since no plasma is generated during the purging in Ohmi. However, Applicants respectfully note that

² Outstanding Office Action, page 5.

the mere fact that no plasma is generated during purging does not, by itself, indicate that the purging is suppressing electrical charging. Rather, the lack of plasma may be due to a wide variety of factors.

Accordingly, Applicants respectfully submit that no proper combination of Flanigan and Ohmi would include all the features of either of amended independent Claims 1 or 12.

As previously noted of Flanigan, Ohmi, Watanabe, or Nagasaki suggests the use of a Paschen curve as recited in amended independent Claims 1 and 12.

The outstanding Office Action cites Paschen itself for the features of dependent Claims 6 and 17.³ However, Applicants respectfully submit that in light of the **purge pressures described in Ohmi (1 Pa)⁴ and (100 Pa)⁵**, a person of ordinary skill in the art reading Ohmi and the remaining cited references would not have looked to the Paschen curve to establish suppression of electrical charging of a component in a processing chamber as recited in amended independent Claims 1 and 12. Ohmi and the remaining references are unconcerned with suppressing electrical charging. Accordingly, no reasonable combination of Flanigan, Ohmi, Watanabe, Nagasaki, or Paschen would include all of the features recited in amended independent Claims 1 or 12 or any of the claims depending therefrom.

For the foregoing reasons, it is respectfully submitted that this application is now in condition for allowance. A Notice of Allowance for Claims 1-7, 9-18, 20-23, and 25 is earnestly solicited.

³ Outstanding Office Action, page 7.

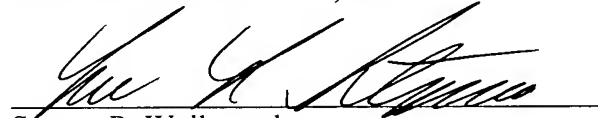
⁴ Ohmi, col. 11, line 66-col. 12, line 1.

⁵ Ohmi, col. 12, lines 38-41.

Should Examiner Dahimene deem that any further action is necessary to place this application in even better form for allowance, Examiner Dahimene is encouraged to contact Applicants' undersigned representative at the below-listed telephone number.

Respectfully submitted,

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